PB87-187753

Superfund Record of Decision (EPA Region 5) Spiegelberg, Green Oak Township Livingston County, Michigan, September 1986

(U.S.) Environmental Protection Agency
Washington, DC

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U.S. Department of Commerce
National Technical Information Service
NTIS

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United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-86/039
September 1986

EPA

Superfund Record of Decision:

Spiegelberg, MI

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SPRINGFIELD, VA 22161

TECHNICAL REPORT DATA
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1. REPORT NO. EPA/ROD/R05-86/039	2.
3. RECIPIENT'S ACCESSION NO. PB87 187758/AS	
4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION Spiegelberg Landfill, MI	5. REPORT DATE September 30, 1986 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report 14. SPONSORING AGENCY CODE 800/00
15. SUPPLEMENTARY NOTES	

16. ABSTRACT

The Spiegelberg site is a waste disposal pit located in Green Oak Township, Livingston County, MI. Currently, the Spiegelberg property is being mined for sand, gravel, and peat deposits. From 1966 to 1977 the site was used for the disposal of domestic waste, with the main disposal area located in an abandoned sand and gravel pit in the northern third of the site. From 1967 to 1978 paint sludge was dumped near the surface water portion of the gravel pit. The paint sludge area is approximately one-half acre in size and is reportedly thirty feet deep in several places. There are two layers of hardened paint sludge: at a depth of three to six feet; and at a depth of thirteen feet. Five-gallon paint buckets were also buried at a depth of approximately ten feet and paint mixed with sand is present at various depths. Only private, domestic wastes have been disposed of at the site since the end of 1978. Organic contaminants have been detected in onsite and downgradient monitoring wells indicating the migration of these contaminants from the site into the ground water. The primary contaminants of concern include: VOCS, organics, inorganics, base/neutral compounds, TCE, toluene, xylene, metals.

The selected remedial action for the site includes: excavation of 15,000 cubic yards of waste material which will be separated into liquid and solid sludges and paint residue with garbage intermixed; offsite incineration of approximately 5,000 cubic yards

(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
~~Record of Decision~~ Spiegelberg Landfill, MI Contaminated Media: gw, soils Key contaminants: VOCs, organics, base-neutral compounds, inorganics, metals		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (*This Report*) None	21. NO. OF PAGES 38
	20. SECURITY CLASS (*This page*) None	22. PRICE

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16. ABSTRACT (continued)

of the excavated waste material; and disposal of the remaining 10,000 cubic yards of waste into a RCRA landfill. The capital cost of this alternative is estimated at $15,771,000 to $18,395,000 depending on the offsite disposal location. No O&M will be required.

Record of Decision

Remedial Alternative Selection

Site: Spiegelberg, Green Oak Township, Livingston County, Michigan

Documents Reviewed

I have received the following document describing the analysis of cost-effectiveness of remedial alternatives for the Spiegelberg site:

- Phased Feasibility Study

Description of Selected Remedy

- Excavate and separate wastes
- Incinerate materials composed of deteriorating 5 gallon containers of liquid paint, paint residues, and garbage
- Landfill in a RCRA approved facility, solidified paint sludges

Declaration

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the excavation and off-site incineration and RCRA landfill disposal is a cost-effective remedy necessary to prevent or minimize the release of hazardous substances so they do not migrate or cause harm to public health, welfare, and the environment. The State of Michigan has been consulted and agrees with the approved remedy.

I have also determined that the action being taking is consistent with remedial goals at the site and is appropriate when balanced against the availability of monies for use at other sites. In addition, the offsite incineration and RCRA landfilling is a cost-effective remedy that provides adequate protection of public health, welfare, and the environment. The State is continuing its Remedial Investigation/Feasibility Study to determine the extent of groundwater contamination and the hydraulic characteristics of the aquifers in order to evaluate potential remedial actions. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of the future action.

September 30th, 1986.
Date

Valdas V. Adamkus
Regional Administrator

Summary of Remedial Alternative Selection
Spiegelberg
Green Oak Township, Michigan

Site Location and Description

The Spiegelberg site is a waste disposal pit located in a rural area in southeastern Michigan. The site is about 40 miles west of Detroit and 1.5 miles from Hamburg, in Green Oak Township, Livingston County, Michigan (see Figure 1). The site can be accessed from Spicer Road which forms the northernmost boundary.

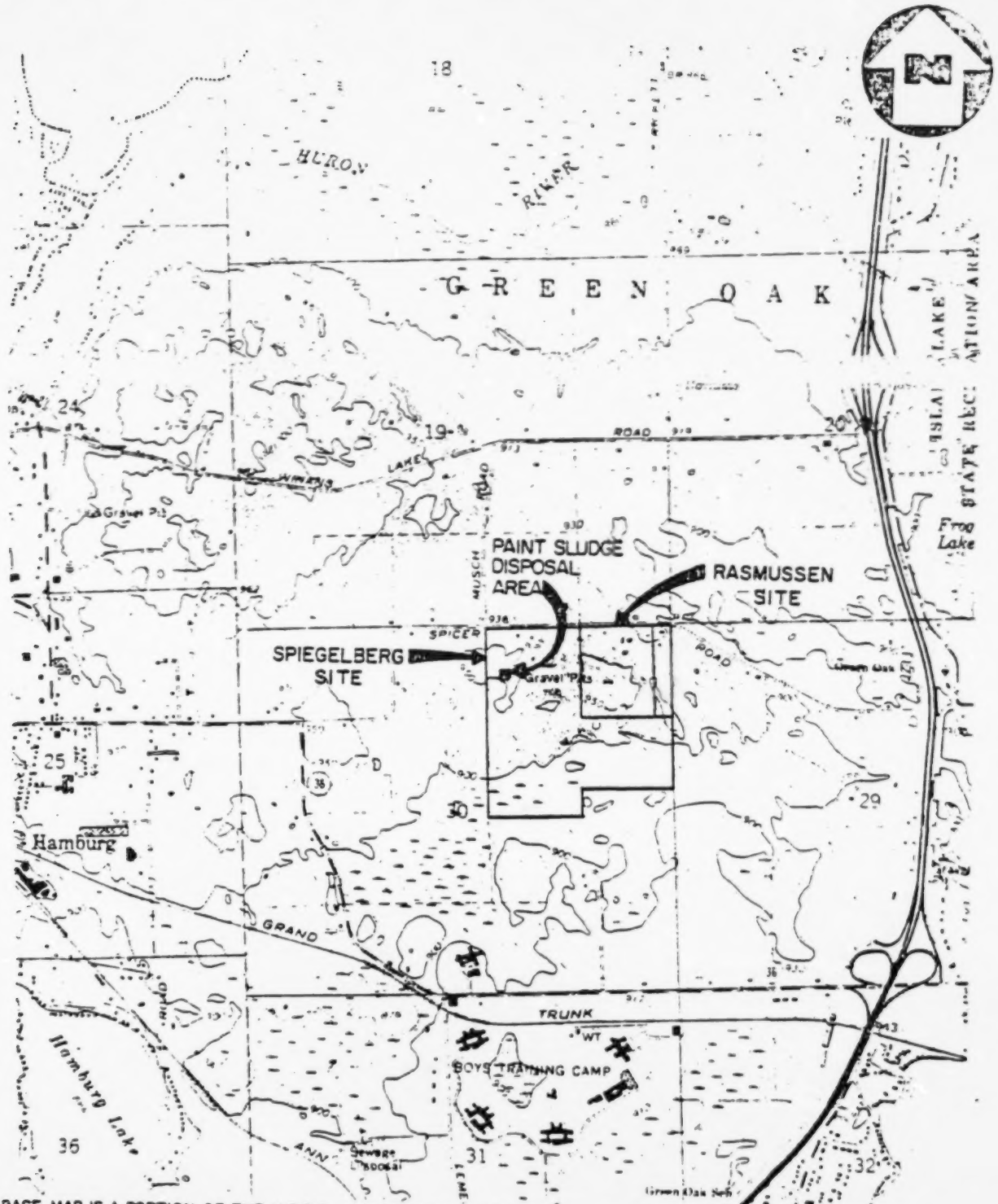
The Spiegelberg property is located on approximately 114 acres. There is a paint sludge disposal area in the northern third of the property at the base of a sand and gravel quarry which covers an area of about one half acre (see Figure 2). Currently the Spiegelberg property is being mined for sand, gravel, and peat deposits. A family living in a rental home and also a barn are located on the northwest corner of the property. Domestic refuse is disposed east of two large metal buildings which are near the center of the site. The site is surrounded by woods, open fields, and rural residences.

A population of several hundred live within one mile of the site. Immediately south and adjacent to the property is the Maxey Boys Training School which contains several hundred long-term residents and employees. North of the site are the Hamburg VFW Post 1224 and the Holy Spirit Catholic Church. Several resort and State recreational areas are also located near the site.

Borings from the site indicate that the site, typical of a glaciated area, is covered with discontinuous layers of clay, silt, gravel, and a heterogeneous mixture of these materials. The glacial deposits contain interbedded aquifers and aquicludes. The site overlies at least two sand and gravel aquifers; an upper unconfined aquifer, and at least one deeper aquifer that lies below a sandy, silty clay zone. The thickness of the saturated zone of upper aquifer beneath the site ranges from less than 20 feet at the paint sludge area to 45 feet at the VFW post near Spicer Road. The total thickness of the upper aquifer ranges from approximately 30 to 70 feet. The aquifer thickness increases because the clay layer which forms the lower boundary of the aquifer is not horizontal. These aquifers may be hydraulically connected at various places. Groundwater flow in the upper aquifer is generally to the north.

Site History

The Spiegelberg site was used for the disposal of domestic waste from 1966 to 1977. The main waste disposal area was located in the northern third of the site in an abandoned sand and gravel pit. Domestic wastes were still being disposed of in 1973 despite numerous requests by the Livingston County Health Department that the owner obtain a refuse dumping permit. Except for private, domestic waste, no other wastes were disposed at the site since the end of 1978.



BASE MAP IS A PORTION OF THE U.S.G.S. HAMBURG, MI QUADRANGLE (7.5 MINUTE SERIES, PHOTOREVISED 1975). CONTOUR INTERVAL 10'.

LOCATION MAP
SPIEGELBERG & RASMUSSEN SITES
LIVINGSTON COUNTY, MI

FIGURE 1

NUS CORPORATION

GENERAL ARRANGEMENT
SPIEGELBERG WASTE DISPOSAL AREA
LIVINGSTON CO., MI
SCALE: 1" = 100'

FIGURE 2

NUS CORPORATION
A Halliburton Company

From 1967 to 1978, paint sludge was dumped in an area near the southwest part of the gravel pit. The paint sludge area is approximately one-half acre in size and is reportedly 30 feet deep in several places. Two layers of hardened paint sludge occur; one at a depth of 3 to 6 feet and another at a depth of 13 feet. Five-gallon buckets of paint are also buried at a depth of approximately 10 feet. Paint mixed with sand and soil is present at various depths. Currently, the paint sludge area is covered with soil so that only small patches of the sludge are visible. Organic contaminants have been detected in onsite monitoring wells and in downgradient monitoring wells indicating the migration of these contaminants from the site into the groundwater.

Current Status

The Spiegelberg site was placed on the National Priorities List (NPL) in December 1982, in group 5 making it eligible for federal funding under CERCLA. The Remedial Investigation (RI) was initiated in May 1984. Sampling and analysis of subsurface soils in the paint sludge area indicate the presence of high concentrations of organic and inorganic compounds from the Hazardous Substances List (HSL). The detection of organic constituents in downgradient monitoring wells and the mobility characteristics of the compounds found in the paint sludge area, indicate that transport via groundwater is a major potential pathway at the site. These results indicate the need for remedial action which addresses source control of the wastes and contaminated soils contained in the paint sludge disposal area on the site, in order to reduce or eliminate exposure of potential receptors to site contaminants. Additional field work will be conducted to address the groundwater portion of this investigation. The source control operable unit alternatives were evaluated through a Phased Feasibility Study (PFS). The operable unit will be a portion of the overall remedial action and will be consistent with the final remedy for the Spiegelberg site in accordance with the NCP.

The study includes sampling of surface soil, subsurface soil, gravel, and air. The sampling program was conducted from January to July 1985. All samples were analyzed for HSL organic constituents. The ambient air sample was analyzed for volatile organics and particulate semi-volatile organics, pesticides, polychlorinated biphenyls (PCBs), and metals. Sample locations are shown in Figure 3.

The surface and subsurface soil samples analyzed for HSL constituents were selected on the basis of field Gas Chromatograph (GC) screening results. The field screening samples were analyzed for 1,2-dichloroethane, trans-1,2-dichloroethene, tetrachloroethene, and/or benzene, chlorobenzene, chloroform, 1,1-dichloroethane, 1,1-dichloroethene, ethylbenzene, methylene chloride, toluene, 1,1,1-trichloroethane, and trichloroethene.

The largest number of contaminants were detected in subsurface soil samples and samples of paint sludge and soil from the test pits. Most of the contaminants detected are volatile organics and base/neutral extractable organics, although low levels of pesticides were detected in surface and subsurface soil samples collected from the paint sludge area. It is estimated that there were 15,000 cubic yards of material with 5,000 cubic yards being hazardous liquid consisting of a mixture of deteriorating 5-gallon containers of liquid paint, paint residues, and garbage. Ten thousand cubic yards are solidified sludge. Tables 1 and 2 show the organic and inorganic contaminants detected at the Spiegelberg site.

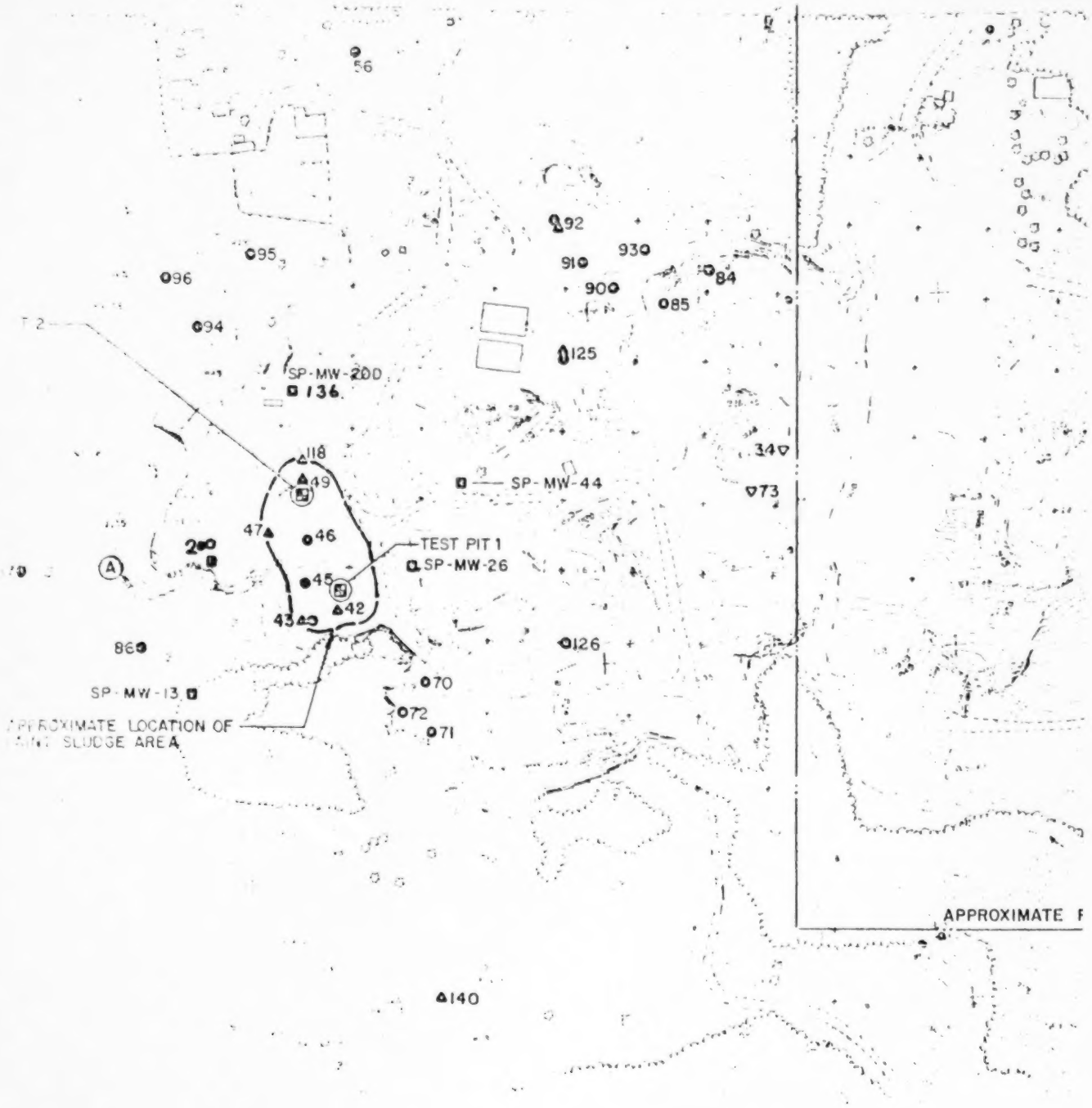

56
092
095
930
910
900
084
096
085
094
125
SP-MW-20D
136
118
049
SP-MW-44
340
073
047
046
TEST PIT 1
SP-MW-26
045
042
043
126
070
072
071
SP-MW-13
APPROXIMATE LOCATION OF
SLUDGE AREA
140
APPROXIMATE

TABLE 1

HSL ORGANICS BY MEDIA (µg/kg)
SPIEGELBERG SITE

Constituent	Range Positive Detections	Gravel: Average Concentration/ Standard Deviation	Gravel: No. of Positive Detections/ Total No. of Samples	Surface Soil: Range of Positive Detections	Surface Soil: Average Concentration/ Standard Deviations	Surface Soil: No. of Positive Detections/ Total No. of Samples
VOLATILES						
acetone	--	--	--	47.7 - 621	53.5/120.9	8/24
2 butanone	--	--	--	340 - 460	33.3/114.3	2/24
2 hexanone	--	--	--	--	--	--
4 methyl 2 pentanone	--	--	--	--	--	--
benzene	--	--	--	31	1.3/6.3	1/24
toluene	--	--	--	4.1 - 13.1	3.1/4.1	10/24
ethyl benzene	--	--	--	--	--	--
total xylenes	--	--	--	25 - 85	0.36/1.4	2/24
styrene	--	--	--	42 - 132	0.7/2.8	2/24
1,1,2,2 tetrachloroethane	--	--	--	14 - 50	4/12	3/24
1,1,1 trichloroethane	--	--	--	--	--	--
1,1 dichloroethane	--	--	--	8 - 17	1/3.8	2/24
tetrachloroethene	--	--	--	9 - 10	1.2/3.3	3/24
trichloroethene	--	--	--	--	--	--
chloroform	--	--	--	6 - 13	0.8/2.9	2/24
methylene chloride	--	--	--	60 - 306	68.1/105	11/24
carbon disulfide	--	--	--	9.3 - 22	2.3/5.7	4/24
BASE/NEUTRAL EXTRACTABLES						
bis(2-ethylhexyl)phthalate	--	--	--	11,700	487.5/2,388.5	1/24
di n butyl phthalate	--	--	--	197 - 410	59.5/125.2	5/24
benzyl butyl phthalate	--	--	--	--	--	--
diethyl phthalate	--	--	--	55 - 160	14/41	--
naphthalene	--	--	--	--	--	--
2 methylnaphthalene	--	--	--	--	--	--
n nitrosodiphenylamine	--	--	--	--	--	--
4 chloroaniline	--	--	--	1,170	48.7/238.8	1/24
benzoic acid	--	--	--	--	--	--
PESTICIDES						
gamma BHC	--	--	--	8.9	0.29/1.4	1/24
delta BHC	--	--	--	9	0.36/1.8	1/24
chlordane	--	--	--	71	3.0/14.5	1/24
heptachlor	--	--	--	5.6	0.23/1.1	1/24

TABLE 1

HSL ORGANICS BY MEDIA (µg/kg)
SPIEGELBERG SITE

Constituent	Gravel: Range of Positive Detections	Gravel: Average Concentration/ Standard Deviation	Gravel: No of Positive Detections/ Total No of Samples	Surface Soil: Range of Positive Detections	Surface Soil: Average Concentration/ Standard Deviations	Surface Soil: No of Positive Detections/ Total No of Samples
VOLATILES						
acetone	--	--	--	47.7 - 621	53.5/120.0	8/24
2 butanone	--	--	--	340 - 460	33.3/114	2/24
2 hexanone	--	--	--	--	--	--
4 methyl 2 pentanone	--	--	--	--	--	--
benzene	--	--	--	31	1.3/6.3	1/24
toluene	--	--	--	4.1 - 13.1	3.1/4.1	10/24
ethyl benzene	--	--	--	--	--	--
total xylenes	--	--	--	2.5 - 6.5	0.38/1.4	2/24
styrene	--	--	--	4.2 - 13.2	0.7/2.8	2/24
1,1,2,2 tetrachloroethane	--	--	--	14 - 50	4/12	3/24
1,1,1 trichloroethane	--	--	--	--	--	--
1,1 dichloroethane	--	--	--	8 - 17	1/3.8	2/24
tetrachloroethene	--	--	--	9 - 10	1.2/3.3	3/24
trichloroethene	--	--	--	--	--	--
chloroform	--	--	--	6 - 13	0.8/2.9	2/24
methylene chloride	--	--	--	60 - 306	66.1/105	11/24
carbon disulfide	--	--	--	9.3 - 22	2.3/5.7	4/24
BASE/NEUTRAL EXTRACTABLES						
bis(2-ethylhexyl)phthalate	--	--	--	11,700	487.5/2,388.5	1/24
di n butyl phthalate	--	--	--	107 - 410	50.5/125.2	5/24
benzyl butyl phthalate	--	--	--	--	--	--
diethyl phthalate	--	--	--	55 - 160	14/41	--
naphthalene	--	--	--	--	--	--
2 methylnaphthalene	--	--	--	--	--	--
n nitrosodiphenylamine	--	--	--	--	--	--
4 chloroaniline	--	--	--	1,170	48.7/238.8	1/24
benzoic acid	--	--	--	--	--	--
PESTICIDES						
gamma BHC	--	--	--	6.9	0.29/1.4	1/24
delta BHC	--	--	--	9	0.38/1.8	1/24
chlordane	--	--	--	71	3.0/14.5	1/24
heptachlor	--	--	--	5.6	0.23/1.1	1/24

TABLE 1
HSI ORGANICS BY MEDIA (µ/kg)
SPIEGELBERG SITE
PAGE TWO

Constituent	Test Pits: Range of Positive Detections	Test Pits: Average Concentration/ Standard Deviation[1]	Test Pits: No. of Positive Detections/ Total No. of Samples	Subsurface Soil: Range of Positive Detections	Subsurface Soil: Average Concentration/ Standard Deviation	Subsurface Soil: No. of Positive Detections/ Total No. of Samples
VOLATILES						
acetone	411 - 1,[illegible]	275/413	3/8	74 - 1,000	147/271	6/15
2-butanone	--	--	--	1800 - 60,000	5,160/15,427	4/15
2-hexanone	655	82/232	1/8	--	--	--
4-methyl-2-pentanone	200 - [illegible]00	52,600/148,000	3/8	--	--	--
benzene	53.2 - [illegible]9	477/1,140	3/8	--	--	--
toluene	16 - 43,[illegible]00	56,700/152,000	3/8	7.6 - 210	33.8/72	8/15
ethyl benzene	24,000 - [illegible],820,000	387,000/1,025,000	3/8	0.8 - 2,500	168/645	3/15
total xylene	17 - 10[illegible],000	1,390,000/3,810,000	6/8	2.6 - 2,000	148/515	4/15
styrene	4.1	0.5/1.4	1/8	2.9 - 210	14/54	2/15
1,1,2,2-tetrachloroethane	--	--	--	--	--	--
1,1,1-trichloroethane	31 - 80	28/35	4/8	2,300	153/604	1/15
1,1-dichloroethane	351 - [illegible]	168/354	2/8	800	53/207	1/15
tetrachloroethene	1.4 - 30[illegible]	46/107	5/8	2,300	153/594	1/15
trichloroethene	72.8 - [illegible]	18/34	2/8	--	--	--
chloroform	38.3 - 7[illegible]	14/28	2/8	--	--	--
methylene chloride	46 - 70[illegible]	223/267	8/8	34.1 - 3,200	305/813	8/15
carbon disulfide	36.2 - 2[illegible]	54/97	8/8	76.4 - 210	51.8/83.7	5/15
BASE/NEUTRAL EXTRACTABLES						
bis(2-ethylhexyl)phthalate	--	--	--	--	--	--
di-n-butyl phthalate	--	--	--	308 - 850	708/285	8/15
benzyl butyl phthalate	--	--	--	--	--	--
diethyl phthalate	--	--	--	510	34/132	1/15
naphthalene	346 - 20[illegible]60	6,840/10,800	4/8	81.6 - 20,000	1,339/5,183	2/15
2-methyl naphthalene	199 - 5,[illegible]0	1,340/2,020	4/8	--	--	--
n-nitrosodiphenylamine	138	17/49	1/8	--	--	--
4-chloroaniline	--	--	--	2165	90.2/442	1/24
benzoic acid	1,572 - [illegible]500	12,800/	4/8	--	--	--
PESTICIDES						
gamma-BHC	--	--	--	--	--	--
delta-BHC	--	--	--	176	11.7/46/4	1/15
chlordane	--	--	--	--	--	--
heptachlor	--	--	--	--	--	--

Notes
Blank space indicates constituent not found above detection limits.
1 Average concentration for test samples may not represent a true statistical average. Samples from Test Pit 1 were selected to provide an indication of the depth of the paint sludge area. Samples from Test Pit 2 were selected to give an indication of "worst case" concentrations.

TABLE 2
HSL INORGANICS BY MEDIA (mg/kg)
SPIEGELDEC.) SITE

Constituent	Gravel			Surface Soil		
	Range of Positive Detections	Average Concentration/ Standard Deviation	No of Positive Detections/ Total No. of Samples	Range of Positive Detections	Average Concentration/ Standard Deviation	No of Positive Detections/ Total No of Samples
aluminum	2,170 - [illegible]0	2,745/813	2/2	1,400 - 7,860	4,328/2,103	24/24
antimony	--	--	--	--	--	--
arsenic	--	--	--	2 1 - 13	2 8/3 8	12/24
barium	12	6/8 5	1/2	7 3 - 325	42/69	19/24
beryllium	--	--	--	0 22 - 0 55	0 08/0 17	2/24
cadmium	--	--	--	4	0 17/0 8	1/24
calcium	77,870 - [illegible]500	84,185/8,031	2/2	773 - 122,760	49 055/36,391	24/24
chromium	13	6 5/9 2	1/2	4 1 - 38	10 2/7 7	21/24
cobalt	--	--	--	4 - 12	3 4/4 7	10/24
copper	--	--	--	1 - 114	13 1/24 2	15/24
iron	6,000 - [illegible]70	6 885/1,252	2/2	5,590 - 19,300	11,593/8,033	24/24
lead	3 - 4 7	3 9/1 2	2/2	2 7 - 86	15 8/22 8	16/24
magnesium	11,600 - [illegible],000	13,300/2,404	2/2	758 - 36,100	11,497/8,565	24/24
manganese	227 - 2[illegible]	244/23	2/2	172 - 1,510	450/362	24/24
mercury	--	--	--	0 072 - 0 64	0 06/0 14	8/24
nickel	--	--	--	6 5 - 27	8 4/8 8	14/24
potassium	--	--	--	337 - 1,984	645/615 6	16/24
selenium	--	--	--	30 - 42	4 4/11 9	3/24
silver	--	--	--	5 3	0 22/1 1	1/24
sodium	--	--	--	560 - 1,810	328/521 7	8/24
thallium	--	--	--	2 - 6	0 33/1 3	2/24
tin	--	--	--	23	0 95/4 7	1/24
vanadium	--	--	--	7 1 - 28	11 4/8 1	19/24
zinc	26 - 32	29/4 2	2/2	26 - 356	59/71	24/24

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TABLE 2
HSI INORGANICS BY MEDIA (mg/kg)
SPIEGELBERG SITE
PAGE TWO

Constituent	Test Pits			Subsurface Soil		
	Range of Positive Detections	Average Concentration/ Standard Deviation	No. of Positive Detections/ Total No. of Samples	Range of Positive Detections	Average Concentration/ Standard Deviation	No. of Positive Detections/ Total No. of Samples
aluminum	522 - 3,340	2,396/979	8/8	1,330 - 6,450	3,741/1,720	15/15
antimony	45	5.6/15.9	1/8	--	--	--
arsenic	2.9 - 8.9	2.1/3.4	3/8	2.7 - 11	5.2/3.5	14/15
barium	7.6 - 733	232/310	8/8	9.0 - 1,640	133/417	15/15
beryllium	0.19 - 0.24	0.054/0.10	2/8	0.27 - 0.77	0.16/0.23	7/15
cadmium	5.4 - 16	3.5/15.7	3/8	2.8 - 2.9	0.38/1.0	2/15
calcium	26,700 - 6[illegible]0	60,050/20,427	8/8	827 - 134,000	55,866/44,198	15/15
chromium	5.2 - 1,710	297/592	8/8	5.6 - 272	29/68	15/15
cobalt	2.2 - 90	14.7/30.5	7/8	4.1 - 9.6	4.3/3.0	12/15
copper	11 - 397	85.6/137.2	8/8	7.8 - 20	12.2/4.0	15/15
iron	5,260 - 97,[illegible]	25,505/31,682	8/8	5,800 - 15,300	10,106/2,802	15/15
lead	4.6 - 18,60[illegible]	2,572/6,500	8/8	3.2 - 1,080	85/277	15/15
magnesium	3,720 - 16,[illegible]	13,790/4,649	8/8	928 - 29,700	11,186/8,636.2	15/15
manganese	164 - 362	276/65	8/8	135 - 497	312/90	15/15
mercury	--	--	--	0.065 - 0.088	0.013/0.03	3/15
nickel	8.4 - 1,650	280/567	8/8	5.9 - 81	16.3/18.5	15/15
potassium	665 - 951	591/380.4	6/8	358 - 1,900	680/370	15/15
selenium	--	--	--	--	--	--
silver	2.6 - 6.3	1.5/2.3	3/8	2.3	0.15/0.6	1/15
sodium	2,140 - 3,37[illegible]	2,862/681	8/8	555 - 2,880	988/809	10/15
thallium	--	--	--	--	--	--
tin	--	--	--	16 - 48	4.3/13	2/15
vanadium	5.7 - 12	9.1/2.2	8/8	8.1 - 22	12.6/5.7	15/15
zinc	45 - 30,70[illegible]	6,225/10,782.5	8/8	21 - 1,750	187/444	15/15

Notes
Blank space indicates constituent not fo[illegible] above detection limits.
[1] Average concentration for test samp[illegible] may not represent a true statistical average. Samples from Test Pit 1 were selected to provide an indication of the depth of the paint sludge area. Samples from Te[illegible]it 2 were selected to give an indication of "worst case" concentrations.

Test Pits

Materials from test pits excavated in the paint sludge area appear to be the most heavily contaminated media in terms of contaminant concentrations and the number of organic chemicals detected. The locations of the test pits are shown in Figure 3.

Materials sampled from the test pits include paint sludge, soil, and soil mixed with paint. Test pit 2, located at the northern edge of the paint sludge area, contained the highest concentrations of organic contaminants. Toluene, ethylbenzene, and xylene, common constituents of paint, were detected at significantly elevated levels.

Table 3 compares the concentrations of inorganic constituents detected in the samples to literature background concentrations. Constituents that significantly exceed background levels from the literature include barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, nickel, and zinc.

Subsurface Soil

Concentration ranges for organics and inorganics detected in samples from the paint sludge area and from outside the paint sludge area are presented in Tables 4 and 5. Table 5 also compares inorganic concentrations with literature background soil concentrations. Metal concentrations in the paint sludge area significantly exceed literature levels. They include barium, cadmium, chromium, lead, nickel, silver, tin and zinc. The compound 1,1,1-trichloroethane was detected in all subsurface soil sampling locations except sample location Nos. 43, 44, and 47. Sample location Nos. 200 and 136 also contained chlorobenzene and/or chloroform and 1,2-dichloroethane. Sample location are shown on Figure 3.

Surface Soil

The surface soil contained fewer organic compounds at lower concentrations than subsurface soils. Chloroform, methylene chloride, toluene, 1,1,1-trichloroethane, and 1,1-dichloroethane were detected in samples from the paint sludge area. Several samples from outside the paint sludge area contained chlorobenzene, chloroform, 1,1-dichloroethane, 1,1-dichloroethene, methylene chloride, and 1,1,1-trichloroethane. Pesticides were detected at two locations in the paint sludge area. No metals were detected at concentrations significantly higher than literature background soil concentrations.

Gravel and Air

Nothing significant was found in air and gravel samples.

Health Risk

The major potential health risk at the site is associated with exposure to known or detected carcinogenic compounds. Known or suspected carcinogenic compounds detected in environmental media include benzene, chloroform, methylene chloride, 1,1,2,2-tetrachloroethane, tetrachloroethene, trichlorethene, bis(2-ethylhexyl) phthalate, n-nitrosodiphenylamine, delta-BHC, gamma-BHC, chlordane, heptachlor, and several inorganic constituents. These and other compounds detected at the site are also associated with acute, chronic, mutagenic reproductive and/or teratogenic effects.

TABLE 3

SPIEGELBERG TEST PIT INORGANICS (mg/kg)
CONCENTRATION RANGES

	Test Pit Materials (mg/kg)		Average U.S. Literature Soil Concentration[1] (mg/kg)
	Range of Positive Detections	Average Concentration	
aluminum	522 - 3,340	2,396	47,000
antimony	45	5.6	NA
barium	7.3 - 733	232	440
beryllium	0.19 - 0.24	0.054	0.63
cadmium	5.4 - 16	3.5	NA
calcium	26,700 - 89,000	68,050	9,200
chromium	5.2 - 1,710	297	37
cobalt	2.2 - 90	14.7	6.7
copper	11 - 397	85.6	17
iron	5,260 - 97,800	25,585	18,000
lead	4.6 - 18,600	2,572.1	16
magnesium	3,720 - 16,900	13,790	4,400
manganese	164 - 362	276	330
nickel	6.4 - 1,650	289.7	13
potassium	665 - 951	591	15,000
silver	2.6 - 6.3	1.5	0.05 - 0.1[2]
sodium	2,140 - 3,730	2,862	5,900
vanadium	5.7 - 12	9.1	58
zinc	45 - 30,700	6,224.6	48

Note: NA - Not Available

Sources:

(1) Shacklette and Boerngen, 1984
(2) Barrett, 1982

TABLE 4

SUBSURFACE SOIL - ORGANICS (µg/kg)
CONCENTRATION RANGES
SPIEGELBERG SITE

	Paint Sludge Area[1]	Samples Outside of Paint Sludge Area[2]
Volatiles		
[illegible]	[illegible]	[illegible]
2-butanone	6,000 - 8,000	1,800 - 60,000
carbon disulfide	90 - 210	76.4
1,1-dichloroethane	800	ND
ethylbenzene	18 - 2,500	0.8
methylene chloride	57 - 460	34.1 - 3,200
styrene	210	2.9
tetrachloroethene	2,300	ND
toluene	7.6 - 210	8.3 - 26
1,1,1-trichloroethane	2,300	ND
xylenes (total)	210 - 2,000	2.6 - 4.3
Base/Neutrals		
di-n-butyl phthalate	308 - 475	340 - 850
diethyl phthalate	510	ND
naphthalene	81.6 - 20,000	ND
Pesticides		
delta-BHC	176	ND

NOTES:

(1) Sample Location Numbers 42, 43, 47, 49, 118
(2) Sample Location Numbers 92, 114, 125, 140
ND - Not Detected

TABLE 5

SUBSURFACE SOIL INORGANICS (mg/kg)
CONCENTRATION RANGES
SPIEGELBERG SITE

Element	Paint Sludge Area[1] Range of Positive Detections (mg/kg)	Samples Outside of Paint Sludge Area[2] Range of Positive Detections (mg/kg)	Average U.S. Literature Soil Concentration (mg/kg)[3]
aluminum	1,930 - 2,270	2,510 - 6,500	47,200
arsenic	2.6 - 11	3.1 - 10	5.2
barium	9 - 1,640	9.8 - 37	440
beryllium	0.44	0.28 - 0.77	0.63
cadmium	2.8	2.9	0.28[4]
calcium	17,500 - 134,000	827 - 84,300	9,200
chromium	5.6 - 272	7 - 16	37
cobalt	4.1 - 6.4	5.2 - 9.6	6.7
copper	8 - 20	7.8 - 19	17
iron	5,890 - 13,700	6,350 - 15,300	18,000
lead	3.8 - 1,080	3.2 - 8	16
magnesium	4,720 - 29,700	926 - 17,800	4,400
manganese	135 - 376	228 - 497	330
mercury	.065	.067 - .068	0.058
nickel	7.6 - 81	5.9 - 20	13
potassium	358 - 647	502 - 1,900	15,000
silver	2.3	ND	0.05[4]
sodium	954 - 1,980	555 - 2,880	5,900
tin	16	48	0.89
vanadium	8.1 - 13	9.2 - 22	58
zinc	21 - 1,750	23 - 45	48

Notes:
(1) Sample Location Numbers 42, 43, 47, 49, 118
(2) Sample Location Numbers 92, 114, 125, 140
(3) Shacklette and Boerngen, 1984
(4) Barret, 1982

Threat to Public Health

Hazardous substances found in the paint sludge area at the Spiegelberg site pose a potential threat to public health and the environment. The major potential pathway of exposure is ingestion of contaminated drinking water. Although contamination has not been detected in residential wells, hazardous substances, whose origin can be attributable to the paint sludge area, have been detected in downgradient monitoring wells. Among the contaminants found in the paint sludge area, the high concentrations of water-soluble compounds such as ketones, monocyclic aromatics and chlorinated aliphatics detected in subsurface soils and wastes have a strong potential to migrate into the groundwater. The mobility characteristics of these contaminants indicate that exposure via ingestion of contaminated groundwater is possible. Domestic uses of the groundwater (showers, cooking, etc.) may also constitute a significant route of exposure.

Direct contact with soils is considered a minor potential threat under existing conditions as surface soils are not appreciably contaminated. Disturbance of the surface soil will increase concentrations to a significant degree and increase the potential for direct human contact. Mining activities or other means of soil disturbance would increase the probability of direct exposure to hazardous constituents.

In order to determine action levels or target risk concentrations for residual contaminants remaining in soils and groundwater after remediation, a Vertical Horizontal Spread (VHS) model and a Diffusion model were used. Spicer Road, the northernmost boundary of the site, was used as a receptor location.

To determine subsurface soil concentrations associated with a particular risk level at a groundwater receptor location, target risk levels associated with exposure to acceptable concentrations at the receptor location must be determined.

Ranges of total carcinogenic risk of 1×10^{-4}, 1×10^{-6}, and 1×10^{-7} were considered for the groundwater (see Table 6). For noncarcinogenic compounds, relevant standards, criteria, or guidelines were selected as target exposure concentrations. Health Advisories, ADIs, RMCLs, or AWQC were selected as target exposure concentrations (whichever value is lower). Target concentrations that are below relevant standards or criteria were also considered (ICF, 1985). These results are shown in Table 7.

The Diffusion Model was used to determine the action levels of soil contaminants that will achieve the target groundwater concentrations discussed above and presented in Table 6 and 7 because it is more conservative than the VHS model. Tables 8 and 9 present these action levels. Excavation of contaminated soils to these concentrations will result in residual risks that correspond to the selected target risk levels. A carcinogenic risk of 1×10^{-6} was selected as the goal for the level of clean-up at the Spiegelberg site. Soil concentration targets are below guidelines as these are calculated to consider additive effects associated with exposure to multiple compounds.

TABLE 5

TARGET GROUNDWATER CONCENTRATIONS ASSOCIATED
WITH TOTAL CARCINOGENIC RISK ESTIMATES
SPIEGELBERG SITE

Compound	Total Carcinogenic Risk of $1x10^{-4}$ (ug/l)(1)	Total Carcinogenic Risk of $1x10^{-6}$ (ug/l)(2)	Total Carcinogenic Risk of $1x10^{-7}$ (ug/l)(3)
chloroform	4.4	0.044	0.0044
methylene chloride	46.6	0.466	0.0466
1,1,2,2-tetrachloroethene	1.75	0.0175	0.00175
tetrachloroethene	5.8	0.058	0.0058
trichloroethene	29	0.29	0.029
n-nitrosodiphenylamine	71	0.71	0.071
gamma-BHC	0.26	$2.63x10^{-3}$	$2.63x10^{-4}$
chlordane	0.21	$2.17x10^{-3}$	$2.17x10^{-4}$
heptachlor	0.10	$1.0x10^{-3}$	$1.0x10^{-4}$

Notes:
(1) Corresponds to a target risk level of $1x10^{-5}$ for each individual compound.
(2) Corresponds to a target risk level of $1x10^{-7}$ for each individual compound.
(3) Corresponds to a target risk level of $1x10^{-8}$ for each individual compound.
(4) Calculations are limited to those compounds for which an evaluation has been conducted by the EPA Carcinogenic Assessment Group.
(5) Calculations assume a 70 kg man ingests 2 liters of water a day over a lifetime.

TABLE 7

TARGET GROUNDWATER CONCENTRATIONS FOR NONCARCINOGENS
SPIEGELBERG SITE

Compound	Target Concentrations that Correspond to Guidelines or Criteria (ug/l)	Target Concentrations Below Guidelines or Criteria[4] (ug/l)
acetone	100,000[1]	7,692
[illegible]	[illegible]	[illegible]
1,1-dichloroethane	4,050[1]	312
ethylbenzene	680[6]	52.3
4-methyl-2-pentanone	3,550[1]	273
toluene	2,000[6]	154
1,1,1-trichloroethane	200[6]	15.4
xylenes	440[6]	33.8
di-n-butyl phthalate	44,000[1]	3,385
di-ethyl phthalate	440,000[1]	33,846
naphthalene	9,000[1]	692
styrene	140[6]	10.3

Notes:
(1) Acceptable Daily Intake (ADI)
(2) Lifetime Health Advisory
(3) Ambient Water Quality Criteria (AWQC)
(4) Calculated by dividing the guideline or criteria by 13 (13 = n + 1; where n = the number of compounds in the mixture)
(6) Proposed Recommended Maximum Concentration Levels (RMCLs)

TABLE 9

SOIL ACTION LEVELS FOR PAINT SLUDGE AREA (µg/kg)
DIFFUSION MODEL
KNOWN OR SUSPECTED CARCINOGENS
SPIEGELBERG SITE

Contaminant	1×10^{-4} Risk Level	1×10^{-6} Risk Level	1×10^{-7} Risk Level	Paint Sludge Area	
				Average	Maximum
benzene	1,290	12.9	1.29	200	3,269
chloroform	234	2.34	0.234	6	76
methylene chloride	990	9.9	0.99	129	705
1,1,2,2-tetrachloroethane	290	2.9	0.29	5	50
tetrachloroethene	1,470	14.7	1.47	142	2,300
trichloroethene	2,100	21.0	2.1	8	73
n-nitrosodiphenylamine	4,610	46.1	4.61	7	138
gamma-BHC	1,042	10.42	1.04	0.4	6.9
chlordane	1,062	10.62	1.06	4	71
heptachlor	1,063	10.63	1.06	0.3	5.6

Alternative Evaluation

A Phased Feasibility Study (PFS) of proposed remedial actions for the Spiegelberg site was completed by NUS Corporation and submitted for public review and comment on September 8, 1986. This is a State-lead operable unit project, being conducted through a cooperative agreement with the State of Michigan Department of Natural Resources. The following site-specific goal was developed as a result of the study.

- Reduce or eliminate the source of contaminates leaching into the groundwater. Ten remedial action alternatives were developed based on this goal and in accordance with the NCP. The alternatives are:

1. No Action
2. Soil Cap
3. Soil Cap with Bentonite
4. Multimedia (RCRA) Cap
5. Excavation/Onsite Landfill Disposal
6. Excavation/Offsite RCRA Landfill Disposal
7. Excavation/Separation of Wastes/Offsite Landfill Disposal
8. Excavation/Mobile Onsite Incineration/Offsite Landfill Disposal
9. Excavation/Offsite Incineration at Baton Rouge, Louisiana

9a. Excavation/Offsite Incineration at Sauget, Illinois

10. Excavation/Offsite Incineration at Baton Rouge, Louisiana/Offsite Landfill

10a. Excavation/Offsite Incineration of Hazardous Wastes at Sauget, Illinois/Landfill of Non-Hazardous Materials

The alternatives were screened for technical feasibility, environmental and public health concerns, institutional considerations and costs. The technical evaluation includes performance, reliability, implementability, and safety.

Alternative 1: No Action

The no action alternative is required by the NCP to evaluate the impact of not performing remedial action at the site. The no action alternative would not require any work to be done. This alternative would not protect public health and the environment because it would not address the existing environmental degradation or potential groundwater contamination which may result from continued releases of contaminants. The alternative would not meet any applicable federal, state, or local requirements.

Cost for Alternative 1- No Action

Capital	N/A
Annual O&M	N/A
Present Worth	N/A

Alternative 2: Soil Cap

A soil cap covering about one-half acre, would consist of approximately 12 inches of a compacted natural soil and 6 inches of a topsoil capable of supporting vegetation. A soil cover would be permeable and although vertical infiltration through the sludge may be reduced, it would not be eliminated, therefore the cap would not provide adequate protection to public health and the environment. Since waste materials are left on the site, a surface cap would retard, but not prevent further pollution migration to the adjacent subsurface soils. The underlying aquifer would still be at risk since contaminant migration from the paint sludge to the groundwater would not be completely remediated. In addition, if the soil cover is disturbed and the wastes are excavated at some future time, adverse health conditions could occur through direct contact. Institutional controls may be required to prevent exposure.

A soil cover is easily implemented and would take about 3 months for construction. Annual inspection is recommended, and occasional repair and revegetation may be required. The soil cap would have a finite life span, and would require perpetual maintenance.

The soil cap alternative would not meet federal RCRA requirements, but could be in compliance with CERCLA. This alternative may not be in compliance with Michigan Acts 245 and 127, since it does not prevent further degradation of the environment.

Act 245 states that the groundwater quality will be maintained and provides for the "nondegradation" of the groundwaters. Degradation is defined as a change in groundwater quality from local background conditions. Any onsite alternative which does not totally stop infiltration and leaching would not meet the intent of this law. Action levels would have to be such that the concentrations remaining would be consistent with the Michigan Water Resource Commission's "nondegradation policy."

Act 127 states that no one can pollute, impair, or cause harm to the environment. MDNR will determine whether action levels selected are consistent with the Act. Since this land is privately owned, this action may also require purchasing and/or condemning the site in an effort to assure that the landowner will not damage or disrupt the soil-covered area.

Cost for Alternative 2: Soil Cap

Capital	$33,000
Annual O&M	1,400 (yrs 1-30)
Present Worth	46,000

Alternative 3: Soil Cap with Bentonite

This surface cap consists of 18 inches of locally available sand with an additive of dry bentonite tilled or harrowed into the top 12 to 14 inches to try to achieve a permeability of less than 10^{-7} centimeters/second (cm/sec). A 6-inch layer of topsoil would be placed on top of the 18-inch base, and proper vegetation would be established. This is a proven technology for reducing infiltration; however, the structural integrity of the cap cannot be guaranteed. Construction would take about 6 months. Although this cap would be more effective in reducing infiltration than the natural soils cap, all the concerns associated with alternative 2 are applicable to this alternative. This cap is not as effective as the RCRA designed cap, which offers greater assurance of structural integrity.

Cost of Alternative 3: Soil Cap with Bentonite

Capital	$99,000
Annual O&M	1,400 (yrs 1-30)
Present Worth	112,000

Alternative 4: Multimedia (RCRA) Cap

The purpose of a multimedia cap is to minimize vertical infiltration through the waste which results in generation of contamination in the underlying groundwaters. A multimedia (RCRA) type cap would include a 2-foot compacted clay layer (permeability < 10^{-7} cm/sec) and a 30 mil synthetic liner, which provides a cap of low permeability. Additionally, the RCRA cap would minimize the risk of dermal contact and migration of contaminated materials.

It is expected that capping the site with a low permeability cap would significantly reduce but not prevent vertical infiltration and subsequent groundwater contamination. The amount of infiltration protection provided by a multimedia cap is much greater than that provided by a soil cap; however, materials remaining in the paint sludge area will continue to degrade and have adverse effects on the surrounding environment.

A RCRA cap is a proven technology. Contruction is expected to take about 9 months. Periodic inspection and maintenance of the cap will be required. A multimedia cap has a finite life span, and would require perpetual maintenance. Eventually, replacement of the cap may be required.

This alternative could comply with CERCLA but will not comply with RCRA if the wastes lie less than 5 feet above the groundwater. Pilot testing will be done to confirm the location of the wastes.

Cost for Alternative 4: Multimedia (RCRA) Cap

Capital	$154,000
Annual O&M	1,400 (yrs 1-30)
Present Worth	167,000

Alternative 5: Excavation/Onsite Landfill Disposal

This alternative would require the excavation of approximately 15,000 cubic yards of paint sludge and contaminated soil and final disposal of this material in a newly constructed, onsite RCRA type landfill. The liquid paints would require solidification prior to placement in the landfill which could include mixing with lime or flyash type materials. All material contaminated in excess of the proposed action levels of $1x10^{-6}$ risk level will be excavated. Field screening will be required to determine when target levels have been achieved.

Excavation is a standard technology which can be implemented using common construction equipment and procedures. The construction and closure should be completed within 1 year providing technical criteria for permits can be met.

The high concentrations of volatile organic contaminants in the paint sludge area suggest a potential for significant releases of these volatiles to ambient air during excavation, creating an adverse impact to the public health. Temporary noise could also have an adverse impact.

The landfill will require regular inspection, maintenance, and groundwater monitoring through its projected life to insure its integrity. Groundwater monitoring is required in accordance with RCRA regulations.

This alternative is expected to meet all applicable federal requirements in regard to soil remediation and source control; however, the Michigan Solid Waste Management Act 641 regulations are more stringent than federal RCRA standards. Under Section R229.6415 of the Michigan Hazardous Waste Management Act, Requirement (3) states that a landfill shall not be located in an area where there are less than 6 meters of soil with a permeability of $1x10^{-6}$ cm/sec or less, immediately below and lateral to the liner. In addition, Michigan regulations require 5 feet of compacted clay in the landfill liner and cap.

It is not certain what the depth of the base of comtamination is but it is known to be uneven. The PFS estimates that the base of the paint sludge waste lies 5 to 7 feet above the water table.

Due to the sandy nature of the soil at the site and the lack of a substantial thickness of natural clay or equivalent beneath the disposed wastes, it is unlikely the Spiegelberg site can meet the above technical requirements of Act 64.

Although the U.S. Environmental Protection Agency does not require permitting on Superfund sites, remedies are expected to meet the intent of permit requirements. The Michigan Department of Natural Resources will require an Act 641 permit, which the State of Michigan will issue, before this alternative can be implemented.

Cost for Alternative 5: Excavation/Onsite Landfill Disposal

Capital	$1,893,000
Annual O&M	32,300 (yr - 1)
	18,800 (yrs 2 - 5)
	10,900 (yrs 6-30)
Present Worth	2,039,000

Alternative 6: Excavation/Offsite Landfill Disposal

This alternative would require the excavation of approximately 15,000 cubic yards of paint sludge and contaminated soil, and final disposal of this material in an offsite RCRA landfill. Materials would be removed to the soil action levels, which would eliminate the possibility of future environmental degradation from this source at the site, making it a reliable option. The remediated area would be backfilled with locally available soil and revegetated. The CECOS International hazardous waste landfill in Cincinnati, Ohio was identified as being a possible disposal site . It is in compliance with RCRA and is currently in compliance with the U.S. EPA offsite policy. CECOS is approximately 400 miles from the Spiegelberg site.

The adverse impacts are the same as those for alternative 5. In addition, a possible hazard would exist in the event of an accident during transportation. Federal Department of Transportation (DOT) Hazardous Materials Transportation Rules must be observed.

The alternative would fulfill applicable federal and state standards and regulations with regard to source control and soil remediation under the current CERCLA law.

Cost for Alternative 6: Excavation/Offsite Disposal

Capital	$10,925,000
Annual O&M	NA
Present Worth	10,925,000

Alternative 7: Excavation/Separation of Wastes/Offsite Landfill Disposal

This alternative differs from alternative 6 in that the wastes are separated according to hazardous or nonhazardous materials based on RCRA characteristics. RCRA characteristics are EP toxicity, corrosivity, ignitability, and reactivity. However, CERCLA wastes are not determined solely based on RCRA characteristics, but also on whether they have hazardous constitutents.

The solid wastes at the site have not been proven to be free of hazardous constitutents, therefore this alternative will not be considered further. The costs are presented for the purpose of comparison.

Cost of Alternative 7: Excavation/Separation of Wastes/Offsite Landfill Disposal

Capital	$7,530,000
Annual O&M	NA
Present Worth	7,530,000

Alternative 8: Evaluation of Excavation/Onsite Mobile Incineration/Offsite Final Disposal

This incineration alternative provides for the excavation and onsite destruction of the volatile organic compounds present in the paint sludge area. Since incineration does not destroy metals, the ash residue from the incinerator will probably contain heavy metal compounds at concentrations that would require disposal in a landfill that is in compliance with RCRA and the offsite policy. For costing purposes, it was assumed that the ash residue would be transported and disposed of at CECOS Landfill in Cincinnati, Ohio.

Since a relatively large, flat area is required to setup and operate a mobile incineration system, extensive grading and site preparation would be necessary. In addition to the space required for the portable trailers, haul roads, and access roads would be constructed, as well as areas for stockpiling of the waste and the ash residue. A supply of fuel, industrial electric power, and boiler grade water supply would also be required.

In conjunction with the incineration technology, the site remediation rate would be limited by the capacity of the incinerator. The initiation of site clean-up will be dependent on the availability of a mobile incinerator, as there are only a limited number of approved units available. Due to the high costs associated with mobilization, site preparation, and permitting, this alternative with a capital cost of $43,091,000 is not cost effective for the amount of material to be incinerated. Only 15,000 cubic yards of wastes are estimated for this site.

Incineration of paint waste materials is an acceptable and proven technology. Mobile incinerators have been proven as effective methods for destroying hazardous, combustible materials. The rate at which the wastes are incinerated can be determined only after more tests on the materials and/or the performance of a test burn.

It is estimated the alternative will take 2 years to complete including site restoration. Materials will be excavated that exceed the action level criteria. This alternative would reduce continued degradation of the underlying groundwaters by removing the source of contamination, thereby protecting public health and the environment; however it is anticipated that the technical requirements of the regulations will cause implementation of this alternative to be very difficult and time consuming.

The technical requirements of the Federal Clean Air Act, the Michigan Air Pollution Act, and the Michigan Hazardous Waste Act (Act 64) must be met in order to implement the onsite incineration. Act 64 involves extensive state permitting. The scrubbers should provide flue gases which meet applicable air quality standards. The alternative is expected to meet all applicable federal and state requirements in regard to source control. If the ash residue is transported to an offsite facility, hazardous materials transport regulations must be met.

Cost for Alternative 8: Excavation/Onsite Mobile Incineration/Offsite Final Disposal

Capital	$43,091,000
Annual O&M	NA
Present Worth	43,091,000

Alternatives 9, 9a: Excavation/Offsite Incineration

This alternative addresses the excavation of 15,000 cubic yards of waste material and incineration of that material at an offsite commercial incineration facility. The difference between 9 and 9a is the offsite location of the incinerator. The waste materials would be excavated, packaged in 30-gallon fiber or plastic drums, and transported by truck to a licensed, commercial incinerator. The selection of an incineration facility would be governed by the capacity and backlog of the available incinerator and by compliance with the U.S. EPA offsite policy.

Two incineration services were evaluated: Rollins Environmental Services, Inc., a large incineration service in Baton Rouge, Louisiana and Trade Waste Incineration, a small incinerator in Sauget, Illinois. It is necessary to evalute both options because the small incinerator will have less capacity and may not be able to handle the large volume of material to be incinerated. Although the larger incinerator will have greater transportation costs, it has a large available capacity and would be able to accept the waste in one batch.

This alternative is expected to meet all applicable federal and state requirements. By taking the material to a permitted, offsite facility the cost as well as the time frame for implementation would be greatly decreased from onsite incineration. Hazardous materials transport regulations must be met for the transport of the material to the incineration site. The alternative is considered a permanent source control measure, providing the most effective protection for public health and the environment.

Cost for Alternative 9, 9a: Excavation/Offsite Incineration

Baton Rouge, Louisiana

Capital	$32,016,000
Annual O & M	NA
Present Worth	$32,016,000

Sauget, Illinois

Capital	$28,817,000
Annual O & M	NA
Present Worth	$28,817,000

Alternative 10, 10a: Excavation/Offsite Incineration/Offsite Landfill

This alternative will excavate the 15,000 cubic yards of contaminated material and separate it into the liquid waste mixture and the solidified paint sludges. The liquid material will be incinerated and the solidified paint sludges will be disposed of in a RCRA landfill. The difference between alternative 10 and 10a is the disposal location.

The incineration sites are the same as alternative 9, and the RCRA facility is the same as alternative 6. It is estimated that one-third of the wastes or 5,000 cubic yards will be incinerated, and 10,000 cubic yards will be landfilled in a RCRA landfill. The excavated area will be backfilled and revegetated. Maintenance would be minimal.

This alternative would meet all applicable federal and state requirements. As in alternative 9, hazardous materials transport regulations must be met for the transport of the material to the disposal site.

The alternative is a permanent source control measure providing adequate protection to public health and the environment.

Cost for Alternative 10, 10a: Excavation/Offsite Incineration/Offsite Landfill

Baton Rouge, Louisiana
Cincinnati, Ohio

Capital	$18,395,000
Annual O&M	NA
Present Worth	18,395,000

Sauget, Illinois
Cincinnati, Ohio

Capital	$15,771,000
Annual O&M	NA
Present Worth	15,771,000

Consistency with Other Environmental Laws

There are several laws and policies that address proposed actions at the Spiegelberg site. The no action alternative would not be in compliance with any federal or state regulations. The soil cap alternatives would not meet federal RCRA requirements. The RCRA cap would comply with RCRA if the base of the wastes lies 5 feet or more above the groundwater. Alternatives 2, 3 and 4 may not be in compliance with Michigan Acts 245 and 127 since they do not prevent further degradation of the environment. Act 245 establishes groundwater quality and Act 127 states no one shall pollute, impair or cause harm to the environment. Since the liquid wastes would remain in the ground with the potential to further contaminate the groundwater, the MDNR could determine the above alternatives do not meet the standards of these acts.

Alternatives 6, 8, 9 and 10 will fulfill all federal regulations. Alternative 5, Onsite Landfill, should meet federal and state Regulations regarding protection of public health and the environment even though a permit may not be required. Meeting the Michigan technical requirements may be difficult and time consuming. Alternative 7, Separation of Wastes/Offsite Landfill Disposal, has been eliminated since it does not meet the requirements for the handling of CERCLA wastes.

Selection Process

The primary threat from the paint sludge area to public health is by ingestion of contaminated groundwater. There is a potential for continued migration from the source of contamination downward into the drinking water source. The no action alternative would do nothing to reduce or eliminate the source of leaching into the groundwater. In addition, it would not meet any federal and state regulations. For these reasons, alternative 1 was eliminated.

Surface capping is a technology used to reduce infiltration from precipitation, thus reducing leaking of contaminants from the wastes and into the underlying aquifer. The cap alternatives 2, 3, and 4 provide different levels of protection, the RCRA cap being the most protective. Although capping retards infiltration, it does not remove the source of contamination. Hazardous wastes will continue to degrade and have adverse effects on the surrounding environment. Caps have a finite life span and require perpetual maintenance and eventual replacement. If the cap is disturbed and wastes are excavated at some time in the future, there is a potential for adverse health impacts. This is of special concern at Spiegelberg as quarrying operations are currently being conducted on the property. In addition, the capping alternatives would not meet federal and state regulations. The cost of the caps range from $33,000 to $154,000. See Table 10 for a summary of cost for all the alternatives considered. Construction time for capping is from 3 to 9 months depending on the type of cap.

Alternatives 5 and 6 evaluate onsite and offsite RCRA landfill disposal. Landfills designed in accordance with appropriate RCRA requirements are standard disposal alternatives and are considered effective in containing the waste. The onsite landfill would meet federal requirements and construction normally would take about 1 year; however, meeting the technical requirements of Michigan regulations would greatly increase the time required for implementation. It is unlikely that this site can meet the technical requirements of Act 64 for the location of an onsite landfill due to the absence of underlying layers of natural clays of the appropriate depth and thickness. The cost of this alternative is $1,893,000. The offsite RCRA landfill would meet federal and state requirements. Although a RCRA landfill is a proven and acceptable technology, it does not provide destruction of contaminated waste and does not provide protection to the general public health and the environment that incineration provides. In addition to destructive technology, incineration does not rely on limited RCRA landfill capacity. Also the Land Disposal Ban demonstrates agency trend toward permanent remedies. Congress has made it clear to the cleanup programs that in the future, alternative technologies will be strongly encouraged, to remediate hazardous wastes. The cost for offsite RCRA landfill disposal is $10,925,000.

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TABLE 10

COST SUMMARY FOR ALTERNATIVES
CAPITAL, O&M, AND PRESENT WORTH COSTS
SPIEGELBERG SITE

	Remedial Action Alternative	Capital	Annual O&M	Present Worth
1.	No action	---	---	---
2.	Soil cap	33,000	1,400 (Yrs 1-30)	46,000
3.	Soil cap with additives (bentonite)	99,000	1,400 (Yrs 1-30)	112,000
4.	Multimedia (RCRA) cap	154,000	1,400 (Yrs 1-30)	167,000
5.	Excavation/Onsite Landfill Disposal	1,893,000	32,300 (Yr 1) 18,800 (Yrs 2-5) 10,900 (Yrs 6-30)	2,039,000
6.	Excavation/Offsite Landfill Disposal	10,925,000	---	10,925,000
7.	Excavation/Separation of Wastes/Offsite Landfill Disposal	7,530,000		7,530,000
8.	Excavation/Onsite Mobile Incineration/Offsite Final Disposal of Ash Residue	43,091,000	---	43,091,000
9.	Excavation/Offsite Incineration at Baton Rouge, Louisiana	32,016,000	---	32,016,000
9a.	Excavation/Offsite Incineration at Sauget, Illinois	28,817,000	---	28,817,000
10.	Excavation/Offsite Incineration at Baton Rouge, Louisiana/Offsite Landfill Disposal at Cincinnati, Ohio	18,395,000	---	18,395,000
10a.	Excavation/Offsite Incineration at Sauget, Illinois/Offsite Landfill	15,771,000	---	15,771,000

The remaining alternatives include incineration or a combination of incineration and landfilling. Incineration provides for the destruction of volatile organic compounds. The ash residue may require landfilling in a RCRA licensed landfill. Incineration is expected to meet all federal and state regulations. Meeting the technical requirements of the necessary regulations will cause implementation of onsite incineration to be very difficult and time consuming. Onsite incineration would cost $43,091,000. Offsite incineration would greatly reduce the cost and the time frame for implementation by reducing the technical requirements. The cost of offsite incineration is $28,817,000 - $32,016,000, depending on location of the incineration site.

The offsite incineration and landfilling alternative separates the waste into liquid wastes and solidified paint sludges. The solidified paint sludges would be landfilled in a RCRA landfill. This would greatly reduce the cost of total incineration and still provide protection to the public health and the environment. Depending on the location of the disposal sites this alternative will cost from $15,771,000 - $18,395,000.

Recommended Alternative

The National Oil and Hazardous Substances Contingency Plan (NCP) [40 CFR Part 300.68(i)] states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial measure which the agency determines is cost-effective and protects public health. Based on the evaluation of the cost and effectiveness of each proposed alternative, the comments received from the public and the MDNR, the following alternative has been determined to be cost-effective as defined by the NCP.

Alternative 10: Excavation/Offsite Incineration/Landfill

The recommended action is considered a source control operable unit remedial measure as defined in section 300.68(e) of the NCP. The objective of the action is to remove the source of continued contaminant migration from the site. This alternative includes excavation of 15,000 cubic yards of waste material and separating it into liquid sludges and paint residue with garbage intermixed, and solid paint sludges. It is estimated there are about 5,000 cubic yards of the combined material which will be incinerated and 10,000 cubic yards of solid paint sludge which will be landfilled in a RCRA licensed landfill. The material will be transported to the incineration site and the landfill site by truck. The length of time to complete this alternative is governed by the size and location of the disposal sites; however, it is expected to take less time than onsite incineration. Alternative 10 is the most cost-effective alternative that will provide adequate protection to public health and the environment.

The capital cost of this alternative is approximately $15,771,000 to $18,395,000 depending on the disposal location. The State of Michigan agrees to contribute ten percent of the source control operable unit costs.

Operation and Maintenance

There are no operation and maintenance requirements associated with this remedy for the operable unit. O&M needs for the final remedy will be evaluated at the conclusion of the RI/FS.

Community Relations

A public comment period was held from September 8 to September 29. Copies of the PFS were made available to the public for review. The Hamburg Township Library and the Brighton City Library served as the repositories. The MDNR issued a press release in the Ann Arbor News and the Brighton Argus announcing the dates of the public comment period. A progress report was sent to notify the public of the public meeting and the alternatives under consideration for this remedy.

The public meeting was held at the Hamburg Township Fire Hall on September 15, 1986. Approximately 40 people were in attendance including representatives from MDNR, U.S.EPA, NUS contractors, and local officials.

The citizens took an active role in the meeting. Their main concern was the potential for their drinking water to become contaminated and any further environmental destruction from the hazardous material. The public is anxious for the clean-up to begin and is concerned about funding. Another issue raised was the effect of the site on their property value. An open forum was held on September 24th to give citizens an opportunity to ask more questions. Responses to written comments are in the attached Responsiveness Summary.

Enforcement

A responsible party search at the Spiegelberg site was completed in August 1983. James Spiegelberg, the property owner, does not have any written records of the waste disposal practices on his property; however, interviews with him revealed that municipal wastes were accepted at the site as well as paint sludges from Ford Motor Company. Other individuals identified as possible sources of information at the site were Douglas and Homer Rasmussen, owners of adjacent property, and Al Pearson, a waste hauler. Accordingly, U.S. EPA sent notice letters on December 12, 1985 to: Douglas and Homer Rasmussen, James Spiegelberg, Al Pearson and Ford Motor Company.

Although Ford's search of its records revealed no evidence of the disposal of paint sludges at the Spiegelberg property, Al Pearson was able to provide the Agency with documentation of his agreement with Ford to dispose of paint sludges. In addition, he provided a description of his disposal practices which entailed the hauling of paint sludges to the Spiegelberg property from the Ford Wayne Truck assembly plant.

Another potentially responsible party identified early in the search was Burton Chemical Company, which allegedly dumped liquid wastes at the site in 1973. Efforts to locate the company in surrounding towns have been fruitless, and none of the notice letter recipients had any additional information concerning this company.

Ford Motor Company has requested meetings with EPA to discuss the remedy selected at this site. A meeting was held in Chicago on August 27, 1986 wherein Ford challenged findings in the Phased Feasibility Study. Additional negotiations are anticipated to extend past the date of the actual signing of the Record of Decision.

Schedule

Approve Remedial Action	9/30/86
Complete Enforcement Negotiations	11/25/86
Award Cooperative Agreement RD/RA	12/02/86
Start Design	12/02/86
Complete Design	10/01/87
Start Construction	10/01/87
Complete Construction	6/30/89

The current schedule will be effective if funds are available for this site pending reauthorization of Superfund. If funds are not available, a new schedule will be developed.

Future Action

The RI/FS addressing the final remedy, is currently being prepared. A response for the remediation of the groundwater will be analyzed. The RI/FS is expected to be completed in March 1987.

Spiegelberg Phased Feasibility Study

Responsiveness Summary

Introduction

A public comment period was in effect from September 8, 1986 until September 29, 1986 to provide for public review of a Phased Feasibility Study (FS) for the Spiegelberg Landfill Superfund site. The PFS had been prepared to evaluate information on a paint sludge trench on the Spiegelberg property and to propose contamination control or clean-up options that could be performed as an operable unit prior to the competion of the full Remedial Investigation/Feasibility Study. Copies of the Phased Feasibility Study were available for public review at the Hamburg Township Library and a public meeting was on September 15, 1986. The meeting was conducted to give staff from the Michigan Department of Natural Resources and the U.S. Environmental Protection Agency the opportunity to explain the PFS to local residents and other interested parties, and th answer questions and receive comments.

This responsiveness summary outlines comments and questions posed at the public meeting, comments received in writing, and agency responses.

Background

The Spiegelberg Superfund site and the adjacent Rasussen Landfill site are located on Spicer Road about 1/2 mile west of U.S. 23 in Green Oak Township of Livingston County. Both sites are listed on the National Priority List for the federal Superfund program and on the State list of sites of environmental contamination promulgated under the Michigan Environmental Response Act.

Gravel mining has been practiced at the Spiegelberg site since before 1940. As early as 1966 there is documentation that a portion of the property was being used for disposal of waste materials. Both domestic and industrial wastes, including liquid wastes, were disposed of at the site at least until 1977.

Site investigation work has revealed groundwater contamination under the site. Test pitting operations were conducted in areas of the site where buried wastes were suspected. The test pitting revealed the presence of paint wastes in solidified and unsolidified form.

A Phased Feasibility Study is a method of expediting control of cleanup for a portion of a contamination site. A PFS may be performed in instances where a source of contamination has been identified and for which enough information exists to permit the evaluation and selection of appropriate remedial measures.

Following a PFS, remedial measures can be implemented prior to the completion of the full-scale RI/FS. The PFS was undertaken for the paint sludge area on the Spiegelberg site in order to determine means to eliminate it as a source of further groundwater contamination.

The draft PFS evaluated twelve different remedial strategies. While the report did not identify a recommended or preferred solution, DNR and EPA staff explained at the meeting that a tentative staff position favors excavation of wastes with off-site disposal either through incineration or combination incineration and RCRA landfilling.

Comments and Responses

The comments made on behalf of Ford Motor Company by Steven C. Nadeau have been reviewed. The major technical concerns articulated therein are: 1) the paint sludges at the site do not pose a substantial threat to human health and the environment; 2) the selection of an offsite remedy is not justified; and 3) the selected remedy for this operable unit is not cost-effective. Generally, Ford Motor Company feels that the data collected at the site is inadequate to support the Agency's selected remedy and consequently has asked that the administrative record be held open until November 1, 1986 for the submission of additional information that is currently being collected and evaluated. The Agency has agreed to do so.

Based on information collected during the RI/FS, the Agency has confidence in its conclusion that the surficial aquifer at the site is contaminated and that the paint sludge disposal area is a source for that contamination. The decision to proceed with a source control operable unit was based on the desirability of reducing additional groundwater contamination by removing a known source. Such an approach to source control is acknowledged in the NCP at §300.68(c) and can be implemented if cost-effective and consistent with a permanent remedy at the site.

It is the opinion of USEPA and MDNR after reviewing data relating to waste characterization and site hydrogeology that an onsite remedy at this particular site is not feasible for these types of wastes. Therefore, the offsite remedy selected is considered appropriate and cost-effective.

Finally, in its formal comments on the PFS, Ford repeats its objections to the public comment period of September 8-29, 1986. Since Ford received a copy of the PFS on September 8, 1986, and submitted its comments to the Agency on September 29, 1986, it had a full 21 days in which to formulate its comments. Insofar as additional information was collected by the State and also collected through Ford's own field tests during the 21 day public comment period, the Agency has agreed to review comments and/or the results of Ford's analyses up until November 1, 1986. The information will be evaluated and a determination made whether it justifies a reconsideration of the Record of Decision at that time.

Additional comments were submitted on behalf of Ford by O'Brien and Gere Engineering, Inc.

Major concerns are:

Comment: The lack of documentation for numerous statements and conclusions made within the draft PFS, as they pertain to the geology of the site and the investigations conducted to date. The failure to provide raw and interpreted field data with the draft PFS rendered the validity of the statements made within the document impossible to evaluate adequately.

Response: O'Brien and Gere Engineers, Inc., have received, through their Freedom of Information Act (FOIA) request all materials MDNR used to arrive at their conclusions, including the following: Well logs, CLP data, well locations, draft hydrogeological technical memorandum study, soil gas reports, onsite daily logs, and correspondence between the contractor and MDNR reviewing the above information. In addition, the PFS report was not intended to contain information that generally belongs in the Remedial Investigation Report.

Comment: Failure to take into account the solidified nature of the paint sludge when estimating the volume of leachate generated by infiltration through the waste materials, and failure to take into account the solidified nature of the paint sludge when estimating the concentration and chemical composition of leachate generated through contact of aqueous infiltration with the waste materials.

Response: In estimating the volume, concentration and chemical composition of leachate generated by infiltration through the waste materials, contaminant characteristics such as solubility and mobility, rather than waste characteristics, were taken into account because hazardous constituents present in the waste were detected in the downgradient monitoring wells. The test pitting effort conducted by MDNR indicated that the solidified paint sludge is interspersed with semi-solid, sludge-like and liquid waste materials. This would make it difficult, and probably invalid, to assume that the volume, concentration and chemical concentration of leachate would be reduced or altered because of the presence of solidified materials. In addition, only limited information was available about the solidified materials. Accordingly, we used "worst-case" assumptions. Extensive sampling and analysis of this material would need to be undertaken in order for us to establish that the type and amount of leachate would be appreciably reduced because of the waste characteristics . Leachability will be addressed during the pre-design phase.

Comment: Inability of the groundwater transport models to take into account the dilution and attenuation effects of aquifer recharge, longitudinal dispersion, biological degradation, chemical degradation, absorption and hydrolysis, and inability of the models to consider the effects of the non-homogeneous nature of the soils in the area, the effect of aquifer thickening and the existence of interconnected aquifers.

Response: The two generic analytic groundwater models were not meant to define the potential plumes emanating from the site. These two models were used to generate information necesssary to support and aid in the performance of the risk assessment. Because of the very nature of risk assessments, the information generated from the models are based on a worst-case scenario, and therefore, are conservative.

For these models, the assumptions used were based on either the maximum or minimum value for a given input variable which would result in a worst case scenario, or if there were sufficient data to make a realistic assumption, then a realistic value would be used.

A number of the specific technical comments questioned the validity of our assumptions. Assumptions are based on the worst case scenario. The Agency believes that predictions which were identified by the commenter as over-estimated are realistic when considering the worst-case scenario. Risk assessment and analysis, by their nature, require conservative information to produce conservative conclusions necessary to protect human health and the environment.

With regard to the remedial action, the information gained by the model supports the need for source control. Under the worst case scenarios, a potential receptor at Spicer Road would incur a health risk in the future without a remedial action. A source control remedial action would remove the source of contamination which should reduce the level of risk in the future to potential receptors by preventing further release of contaminants and thereby limiting extent of future groundwater remediations.

The models were not meant to define the groundwater contamination plume at the site. Plume definition will occur in future phases of the remedial investigation. At that time, additional information regarding the geological and hydrogeological conditions of the site can be obtained, analyzed, and incorporated into a more complex, site specific plume modelling effort.

Comment: The absence of field data in the draft PFS for groundwater conditions in the shallow aquifer directly downgradient to the waste materials. Data generated by O'Brien and Gere from wells installed on September 18 and 19 indicate that, with the exception of approximately 10 ug/l of 1,1,1-trichloroethane, groundwater at these locations is free from contamination predicted by the models.

Response: Although it is recognized that additional data would increase the certainty of the conclusions drawn, the absence of this information does not prohibit the determination of a potential release to the environment.

Upon receipt of information provided by O'Brien and Gere Engineers Inc., on or before November 1, 1986, we will review and evaluate this information to determine whether it justifies a reconsideration of the Record of Decision at that time.

Comment: The absence of a description of the levels of precision associated with the concentrations of groundwater residues predicted by the models and the absence of an estimate of the width and areal extent of the plume predicted to occur at Spicer Road based on the model output.

Response: It is not the intent of the model to provide minute precision or boundaries of a plume, nor is it required by the NCP. Rather, it is intended to present potential future risks to receptors.

Comment: Inappropriate presentation and use of the "high" and "average" residue concentrations. Misrepresentations of the paint sludge residues as soils residuevalues in table C-1. Both considerations result in an overestimate of leachate and groundwater residue prediction, which ultimately result in an overstatement of human health risks associated with the paint sludge disposal area.

Response: The Public Health Assessment for Spiegelberg was prepared according to guidance contained in the Endangerment Assessment Handbook, August 1985. Groundwater models utilizing "high" and "average" contaminant concentrations to predict both maximum and average contaminant releases are standard in Public Health Assessments. By using this approach we are able to develop a range of actual and potential public health risks. The conservative risk estimate is necessary to compensate for uncertainties in sampling and analyses, groundwater models, unknown health effects of complex mixtures of contaminants, and sensitive subgroups in the population.

Comment: Inadequate documentation of the domestic use exposure scenario.

Response: Consistent with U.S. EPA Endangerment Assessment Guidance, the domestice use exposure scenario was based on standardized assessment procedures, established in the endangerment handbook USEPA April 1985f. Methods for Assessing Exposures to Chemical Substances, Volume 2. EPA 560/5-85-002, U.S. Environmental Protection Agency, Washington, D.C. This reference is sited in the PFS.

Comment: No presentation of the incremental reduction in risk when comparing the feasible remedical scenarios.

Response: We are not required by the NCP to present incremental reductions in risk for each alternative evaluated by the PFS. Instead each alternative is compared to the base-line no action alternative where risks have been identified in the Public Health Assessment. The selected alternative in accordance with the NCP is a "cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment [40 CFR 300.68(i)].

Comments received from interested citizens are addressed as follows:

Comment: It is the feeling of three commenters that the material at the site is not hazardous and money should not be spent to remove it. In addition it was suggested if there is any hazardous material present, its removal would cause more ground and air contamination.

Response: Selection of the No Action alternative will not prevent future degradation of the groundwater which has been identified as a potential pathway for human exposure by the risk assessment. The threatened aquifer is currently being used as a primary drinking water supply.

Comment: Several commenters indicated a sense of relief that on-site remedies were not being recommended. Given that staff positions at the meeting were only tentative, one person asked whether or not further public comment would be sought if, through the review process, any on-site remedy became favored.

Response: EPA and MDNR staff positions favor excavation with off-site disposal. The U.S. EPA Regional Administrator, who must sign a Record of Decision authorizing the remedial measures to be employed, has the authority to concur or not concur with staff level recommendations. If a significant change in the favored alternative occurs during the review process, public comment will again be sought.

Comment: While on-site incineration doesn't appear to be cost-effective as a means of disposing of paint sludge trench wastes alone, this option might be cost-effective and the most appropriate course of action if all wastes at both Spiegelberg and Rasmussen sites were considered together.

Response: The Phased Feasibility Study approach does limit the range of potential alternatives because of the need to focus on only a portion of the wastes and contaminants present at a site. However, any remedy resulting from a PFS must be consistent with final remedial actions at the site. This, of course, requires that professional staff make judgments as to what final remedies might be. DNR and EPA staff feel that excavation and off-site disposal will be most consistent with final site remedies at the Spiegelberg site.

Comment: The PFS should investigate more closely the provision of alternate water supply to nearby residents. The provision of an alternative water supply would eliminate the major potential source of exposure documented in the PFS, so that a lesser degree of cleanup at a lower cost may be acceptable.

Such a course of action would also help to reduce the stigma that the community feels and help to maintain property values. The provision of an alternate water supply should be priced out in combination with some at the less costly clean-up methods.

Response: The PFS addresses one source of groundwater contamination. Both public health and environmental resources need to be addressed by the remedy selected. The feasibility study for the remainder of the two sites will address the issue of groundwater contamination, and at that time provision of alternate water supply will be more closely examined.

Comment: Concerns were expressed over local groundwater contamination. Have contaminants traveled as far as Spicer Road? Are the contaminants found traceable to the paint sludge trench?

Response: Contaminants have been found north of the paint sludge trench as far as Spicer Road. While the contaminants found in monitor wells north of the paint sludge trench have been also found in the trench itself, current information is not sufficient to assume that the trench is the only source. DNR staff will install several additional monitor wells to fill in remaining gaps in data.

Comment: What is the policy for testing private wells in the area. Commenter indicated he has just built a house less than 1/2 mile from the site and would like to have his well tested.

Response: The Livingston County Health Department, in conjunction with the Michigan Department of Public Health, has implemented a regular well testing program for homes within 1/2 mile of the site. The testing program has involved collecting samples from a portion of the homes each quarter, so that each home is tested once a year. This program is considered quite adequate for monitoring the quality of private drinking water supplies. To date, no contaminants have been found in any private wells. DNR staff have notified Livingston County Health Department about the new home within the 1/2 mile testing radius.

Comment: The endangerment assessment discussion points out the fact that we do not know what cumulative health effects will result from exposure to a variety of chemicals present in the groundwater at the site.

Response: This is indeed true. The potential health effects from chronic exposure to a single chemical is only poorly understood. There have been even fewer studies and thus even less is understood about the cumulative impact of exposure to a combination of chemicals.

Comment: Why is gravel mining still underway at the Spiegelberg site? Isn't there the potential for spreading contaminants through the mining and sale of gravel?

Response: Citizens first expressed these concerns in 1984. While Mr. Rasmussen has voluntarily ceased hauling from his property, Mr. Spiegelberg has maintained a gravel mining and hauling business. DNR staff has tested gravel for contaminants form the mining area, from on-site stockpiles, and from area roadways where travel had been used. The most recent gravel testing took place in winter of 1986. To date, the test results have shown the gravel to be clean. Gravel is not being excavated from the paint sludge area or other areas where waste material is suspected.